Commercial Deployment of Integrated Gasification Combined Cycle Power Plants

An Analysis of Potential Government Incentives

Presented to:

Public Service Commission of Wisconsin

Presented by:

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Overview

- **Background**
- **Approach**
- **Risk ratings**
- **Financial incentives**
- **EPACT 2005 vs. highest risks**
- **Implications for Wisconsin**
- **Questions**

*Background – The Financing Challenge**

- **"IGCC Projects Face Higher Construction Risks"**
- **"IGCC Technology Faces Higher Capital Costs" (vs. SCPC)**
- **"Reliability Issues Are Front And Center"**

There is general consensus that IGCC needs incentives to compete head-to-head in the near-term.

*Standard & Poor's. October 2005.

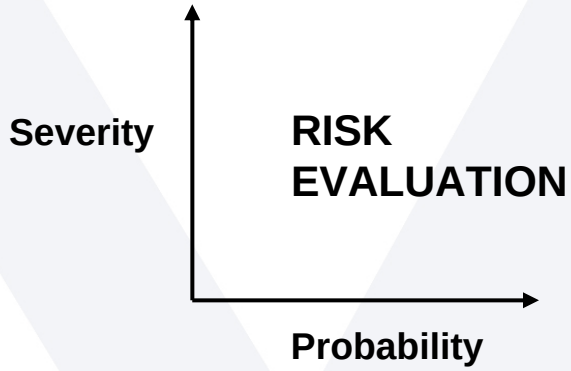
Background – The Financing Challenge

- **In Spring 2005, DOE, EPRI and EPA commissioned Scully Capital to conduct a "Business Case" analysis of commercial deployment of IGCC, which focused on:**
  - Evaluating critical business risks;
  - Clarifying financial impacts of incentives under consideration
  - Highlighting how different incentives affect different owner types; and
  - Estimating the budgetary cost associated with different incentives.
- **The study built on similar analyses performed on nuclear power ("The Business Case for Nuclear Power").**
- **The analysis specifically avoided cost comparisons with SCPC.**
- **In August 2005, EPACT 2005 was passed and contained many of the incentives that were the subject of our analysis.**

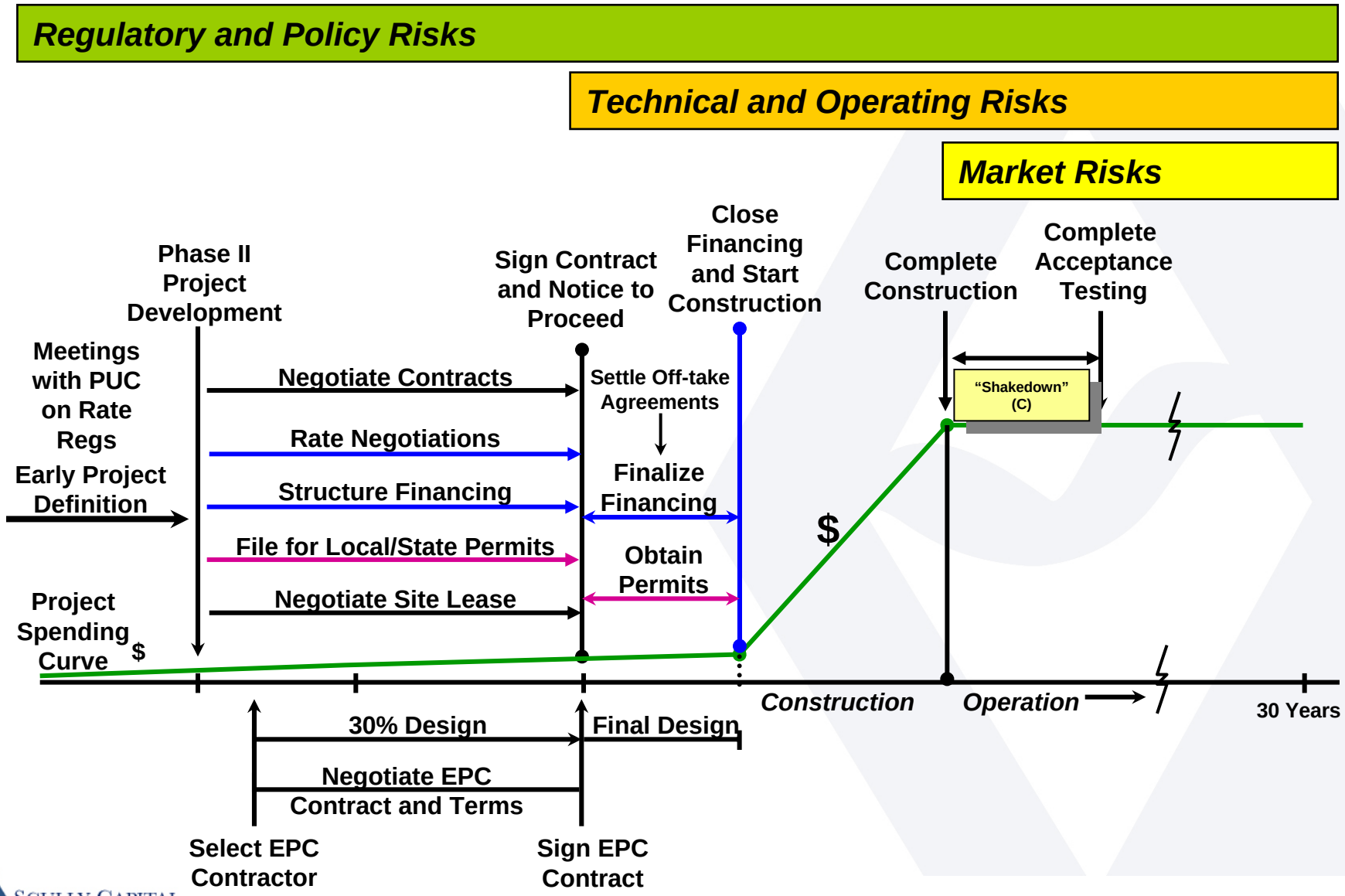
Approach

- **Interview industry stakeholders to quantify perceptions regarding risks that represent deployment barriers.**
- **Develop a model to quantify financial impacts of a variety of government incentives on different owner types:**
  - Investor-Owned Utilities (IOU);
  - Merchant Power Producers (MPP);
  - Independent Power Producers (IPP); and
  - Public Power (PP).
- **Quantify the cost to the taxpayer in terms of "Budget Score".**
- **The project resulted in:**
  - A project-level assessment of the relative power of incentives under consideration;
  - Some insights on how incentives address the risks that present barriers to commercial use; and
  - The budget score associated with each incentive.

Risk: Analysis of Transaction Chain Views



Overview and Approach to Risk Assessment



Recap: Highest Risk Ratings (2004 v. 2005)

High capital cost and excessive downtime remain high risks for all owner types. Critical regulatory issues (e.g., where IGCC carries advantages) are also a focus. Environmental (state, national) & utility commission policies are not well defined.

Q#	Risk Area for IGCC Highest Risks	A Probability	B Severity	A x B Rating	2004 Rating
1	High Capital Cost	3.8	3.9	**14.5**	**19.2**
3	Excessive Downtime	3.5	3.7	**13.1**	**15.2**
8	Materials & Budget Overruns	3.3	3.5	11.2	10.4
10	EPC/Vendor Wrap	2.9	3.6	10.3	6.8
12	State Air Permitting on PC	3.8	3.5	**13.3**	10.9
15	Little Carbon Capture Value	3.4	3.2	10.8	10.8
18	No State Policies for IGCC	3.2	3.6	11.2	11.7
19	Nat'l Policy on IGCC Lags	3.2	3.7	**12.0**	**13.7**
26	PUC Rate Approval Fails	3.1	3.9	**12.0**	**12.5**
27	Financing Difficult	3.4	3.9	**13.4**	**16.1**
	Overall Average	**2.8**	**3.2**	**9.1**	**9.5**

Risks & Responses: Observations for 2005

- **Top Concerns Remain Constant: High capital cost and excessive downtime. Will performance wraps be adequate? No signed deals yet leaving some uncertainty about price, terms.**
- **Concern about lack of clarity of state regulatory policies on conventional coal is rising, which adds risk for competitiveness of IGCC plants. This risk jumped the most since last year.**
- **Risk of natural gas prices dropping was rated lower than 2004, but carries big impact.**
- **Owners remain skeptical that carbon capture advantages will materialize by 2010.**
- **Concerns about coal transport constraints doubled, but are not high yet.**
- **Lack of clarity that PUCs will accept high capital costs to gain long-term emissions and rate stability remains of concern.**
- **Workforce issues (for construction and operation) rate low.**

"Lift" Analysis of Financial Incentives

- **Covered incentives discussed during development of Energy Policy Act of 2005.**
- **Included the incentives approved in EPAct 2005.**
- **Involved extensive financial modeling.**

Plant Cost and Configuration Assumptions

Technical Parameters	
Net Capacity	520 MWe
Net Heat Rate	8600 Btu/kWh
Coal Type	Pittsburg 8
Spare Gasifier	Yes
SCR Included	No
Construction Time	3 Years
In Service Date	2009
Project Life	30 Years
Capital Costs (in 2004 Dollars)	
Plant Costs	$839 Million
Financing and Development	$122 Million
Other	$ 19 Million
TOTAL	**$980 Million**
Operating Parameters (in 2004 Dollars)	
Fixed Costs	$30.2 Million / Year
Insurance Costs	$3.6 Million / Year
Property Costs	$10.9 Million / Year
Variable Costs	$0.9 mills / kWh
Fuel Costs	$1.5 /MBtu
Availability Ramp-Up in Years 1,2,3	60%, 70%, 80%
Availability in Steady State (Year 4 onward)	90%
Average Availability Over Project Life	88%

Overview of Incentives

Tax-Based Incentives	Credit-Based Incentives
Production Tax Credit (PTC)	Loan Guarantee
Accelerated Depreciation	Loan Guarantee – EPACT 2005
Investment Tax Credit (ITC)	Direct Federal Loan
Tax-Credit Bonds	3Party Covenant

Tax Incentive LCOE Impact

($/MWh)

Incentive	Investor Owned Utility	Merchant Power Producer	Independent Power Producer
Tax-Based Incentives			
Production Tax Credit (0.9¢/KWh)	4.04	6.99	6.99
Production Tax Credit (1.80¢/KWh)	8.09	16.22	17.84
Accelerated Depreciation	2.96	4.65	6.25
Investment Tax Credit (20% on Gasification Portion)	3.14	3.05	4.18
Tax Exempt Bonds	0.96	N/A	N/A
Tax Credit Bonds	N/A	N/A	N/A
ITC and AD	5.89	9.46	11.75

Credit Incentive LCOE Impact

($/MWh)

Incentive	Investor Owned Utility	Merchant Power Producer	Independent Power Producer
Credit-Based Incentives			
Loan Guarantee	0.58	2.36	9.12
Loan Guarantee - EPACT 2005	(1.44)	(0.12)	7.04
Direct Loan	1.71	3.40	10.55
3Party Covenant with Leverage	6.90	12.06	11.78
3Party Covenant w/o Leverage	0.32	5.19	N/A

Range of LCOE Benefits

($/MWh)

- **Investor Owned Utilities:**
  - Tax incentive provide the most “lift” for IOUs—tracking well with EPRI findings.
  - IOU results are less sensitive due to normalization process embodied in rate making.
  - The “juice” in the 3Party Covenant is tied to its “leveraged return” assumption.

- **Merchant Power Producers and Independent Power Producers:**
  - Credit-based incentives benefit leveraged MPPs and IPPs due to lower interest rates—and better access to debt.
  - MPPs and IPPs exhibit more LCOE sensitivity than IOUs.
    - Reflects “price taker” status and dynamic tax effects.

Updates

- **EPACT 2005 provided the following incentives for IGCC**
  - Investment Tax Credits
  - Tax Credit Bonds
  - Loan Guarantees

- **The impact of these incentives will vary depending on ownership structure, allocation of incentives and design of loan guarantee program.**

EPACT 2005 vs. Highest Risks

Highest Risk Ratings		EPACT 2005		State Incentives (?)
		Tax Incentives	Credit Incentives	
1	High Capital Cost	✓	✓	
2	Excessive Downtime		✓	
3	Materials & Budget Overruns			
4	EPC/Vendor Wrap			
5	State Air Permitting on PC			✓
6	Little Carbon Capture Value			
7	No State Policies for IGCC			✓
8	National Policy on IGCC Lags	✓	✓	
9	PUC Rate Approval Fails			✓
10	Financing Difficult		✓	✓

Implications for Wisconsin

- **Past concerns regarding IGCC**
  - Cost to build and operate an IGCC unit is unknown
  - Technology concerns

- **As designed, Federal incentives could improve the economics of IGCC and/or insulate the rate-payers from shortfalls in project performance.**

- **State initiatives could further encourage investment in IGCC by:**
  - Reducing uncertainty in the PUC approval & permitting processes;
  - Placing a value on environmental benefits of IGCC; and
  - Addressing long-term market risk through the approval of PPA's or leases associated with IGCC.

Q&A

Supplemental Information

Background – The Financing Challenge
*Key Credit Criteria**

Construction

- **Fixed price, turnkey, fully wrapped EPC contract with experienced and creditworthy contractor**
- **Performance guarantee covering entire plant, including gasification island**
- **Conventional commissioning / completion tests adjusted to reflect IGCC ramp-up period**
- **Performance and delay damages based on milestone approach**
- **Aggregate liquidated damages at least comparable to other project financed IPPs**

Ramp-Up/ Availability

- **Plant designed to maximize availability**
- **Guarantee of availability throughout ramp-up**
- **Liquidated damages if availability tests are not met**
- **Mechanisms to cover cash shortfalls and cost overruns (e.g., insurance, liquidity, facilities, reserves, guarantees)**

Revenues

- **Long-term PPA with utility for plant capacity and output**
- **Staged, flexible increases in PPA availability requirements during ramp-up**
- **By-products sold under contracts to generate stable additional revenue stream**
- **By-products exempted from solid waste permitting requirements**

Environmental/ Regulatory

- **IGCC-specific permitting requirements and environmental standards**
- **No grey areas / overlay of permitting / environmental regulations**
  - **Chemical / power plant**
  - **Coal- / gas-fired power plant**

Critical financing issues arise around the time of completion. Tests for completion and commercial operation need to be redefined to accommodate IGCC's ramp-up period.

* "IGCC OUTLOOK: Wall Street Perspective on IGCC Technology" Credit Suisse First Boston. July 2004.

Financing Assumptions

Financing Assumptions:	Investor Owned Utility	Merchant Power Producer	Independent Power Producer	Public Power
Capital Structure:	45% Equity, 55% Debt	40% Equity, 60% Debt	30% Equity, 70% Debt	10% Equity, 90% Debt
Interest Rate:	6.5%	8%	8%	4.5%
Amortization:	Level Principal	Mortgage Style	Mortgage Style	Level Principal
Loan Term:	30 Years	20 Years	20 Years	30 Years
Reserves:	No Reserves Specific to Project	No Reserves Specific to Project	Debt Service Reserve	No Reserves Specific to Project
Allowance for Funds Used During Construction:	Recovered in Rates	N/A	N/A	N/A
After-Tax Equity Internal Rate of Return (Range):	N/A	13% - 16%	15% - 18%	N/A
Return on Equity:	11.5%	N/A	N/A	N/A
Weight Average Cost of Capital:	7.3%	8.1%	7.9%	4.5%
Marginal Income Tax Rate:	39.2%	39.2%	39.2%	N/A
Tax Loss Benefits:	Utilized Currently	Utilized Currently	Utilized Currently	N/A

Budgetary Costs

($ Millions)

Incentive	Investor Owned Utility		Merchant Power Producer		Independent Power Producer		Public Power	
	Budget Score	Total	Budget Score	Total	Budget Score	Total	Budget Score	Total
Tax-Based Incentives ($M)								
Production Tax Credit (0.9¢/KWh)	234	344	234	344	234	344	N/A	N/A
Production Tax Credit (1.80¢/KWh)	467	689	467	689	467	689	N/A	N/A
Accelerated Depreciation	179	0	179	0	179	0	N/A	N/A
Investment Tax Credit	162	144	162	144	162	144	N/A	N/A
Tax Exempt Bonds	(4)	124	20	145	35	174	N/A	N/A
Tax Credit Bonds	N/A	N/A	N/A	N/A	N/A	N/A	180	442
ITC and AD	324	1.44	324	1.44	324	1.44	N/A	N/A

Budgetary Costs

($ Millions)

Incentive	Investor Owned Utility		Merchant Power Producer		Independent Power Producer		Public Power	
	Budget Score	Total	Budget Score	Total	Budget Score	Total	Budget Score	Total
Credit-Based Incentives ($M)								
Loan Guarantee	11	11	61	61	61	61	N/A	N/A
Direct Loan	11	11	70	70	64	64	N/A	N/A
3 Party Covenant[1]	17	17	20	20	20	20	N/A	N/A
3 Party Covenant w/o Leverage[1]	17	17	20	20	N/A	N/A	N/A	N/A

- **Tax incentives, which score dollar-for-dollar, are expensive.**
- **IOUs better credit standing translates into lower budget scoring.**
- **3Party Covenant improves scoring by reducing default exposure.**

Overview of Incentives

Type of Incentive	Description
Loan Guarantees	Federal agency guarantees the timely payment of principle and interest on a loan made by a private third party to the operator of an IGCC plant.
Direct Federal Loan	Federal agency makes a long-term loan to the project owner to cover a portion of the cost of a facility.
3Party Covenant	The 3Party Covenant envisions a federally backed loan guarantee that allows a sponsor to promote a non-recourse project with an 80:20 Debt to Equity structure. The sponsor benefits from funds provided during construction to cover return on capital and assurance of full cost recovery.
Production Tax Credit (PTC)	A PTC provides the taxpayer with a credit against income tax otherwise due based on the amount of energy actually produced from a facility.

Overview of Incentives (continued)

Type of Incentive	Description
Accelerated Depreciation	Internal Revenue Service Code allows a deduction against gross income for depreciation, and specifies various methods for computing the allowance for depreciation.
Investment Tax Credit (ITC)	Under the Internal Revenue Code, an ITC provides the taxpayer a credit against regular income tax otherwise due, based on a percentage of taxpayer investment in specified equipment and facilities.
Tax-Exempt Financing	Interest paid on obligations issued by state and local governments is exempt from federal income tax, with the exception of private activity bonds.
Federal Project Output Insurance	Insurance Program under which the federal agency covers a portion of the economic loss resulting from a project's failure to meet its designed availability target during its first ten years of commercial service.
Price Guarantees / Federal PPA	Federally backed off-take (via a Power Marketing Agency (PMA) or Department of Defense (DOD) facility), effecting a pricing "floor" on all or a portion of plant output.

Risk Ratings: Broad Set of Interviewees

Interviewee Categories

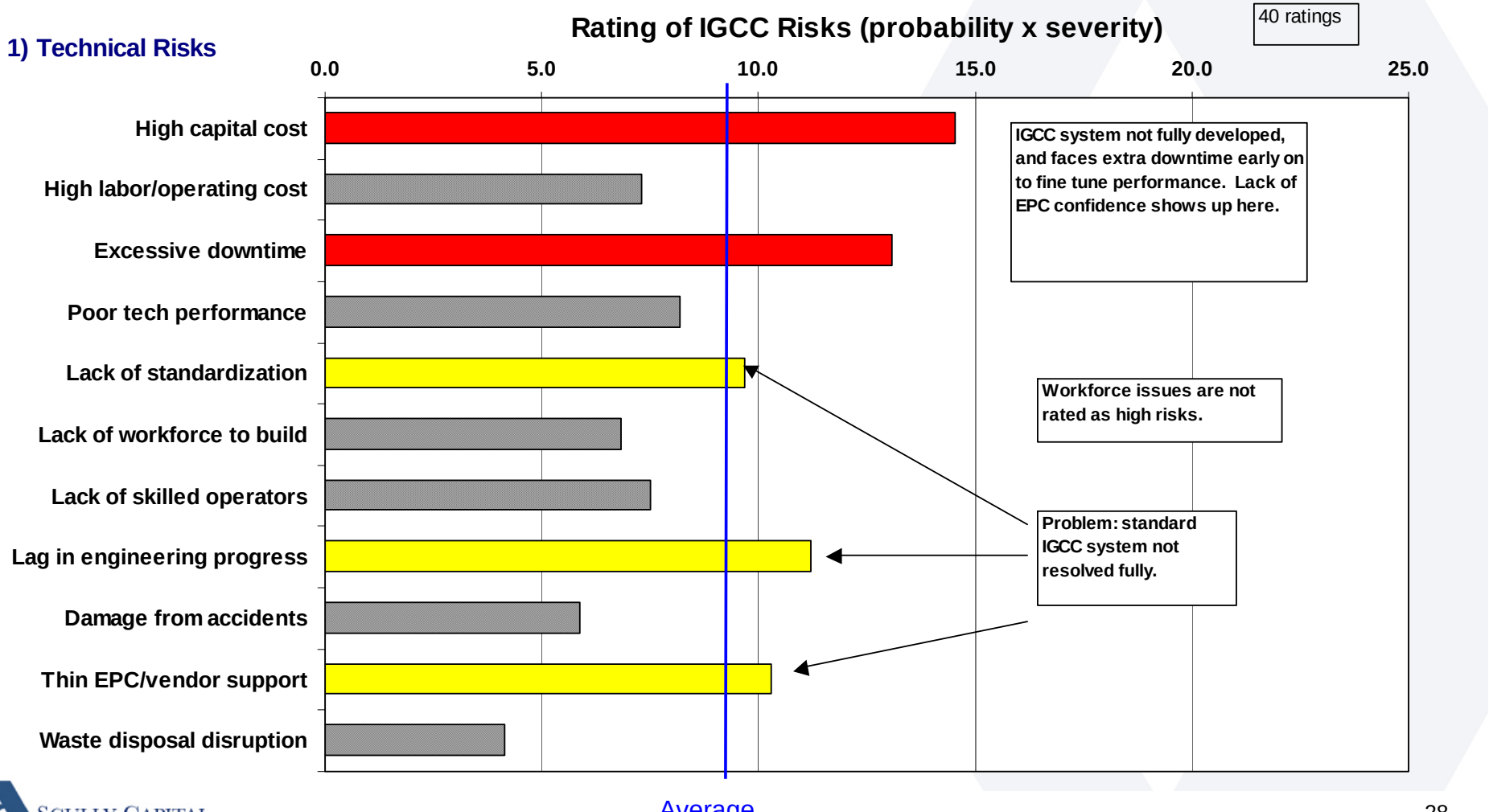
1. Vendors & Tech firms
2. Engineering contractors (EPCs)
3. Utilities (regulated, merchants, hybrids)
4. Independent power co's (IPPs)
5. Public Power & Co-ops
6. Government agencies
7. Public Utility Commissions
8. State / Local Agencies (Comm; Devel)
9. Fuel / Coal / Chemical companies
10. Financial (Banks, Funds, Insurance)
11. Rating agencies
12. Transmission entities (TransCos)
13. "Pragmatic" NGOs (vs. "ideologues")
14. Universities / Research centers

Examples

- *GE, ConocoPhillips, Praxair, GTC*
- *Bechtel, Fluor, Parsons, B&W*
- *AEP, Cinergy, Duke, TVA*
- *Excelsior, Baard, Tondu, TriGen*
- *APPA coal group, NRECA*
- *DOE, EPA, NETL*
- *NARUC + OH, IL, IN, PA*
- *NASEO + Coal boards, RDAs*
- *Eastman, Peabody, Kennecott*
- *CSFB, JP Morgan, SwissRe*
- *S&P, Fitch, Moody's*
- *PJM, MISO*
- *NRDC, CATF, WRI, EDF*
- *UND-CEED, SIU, UK*

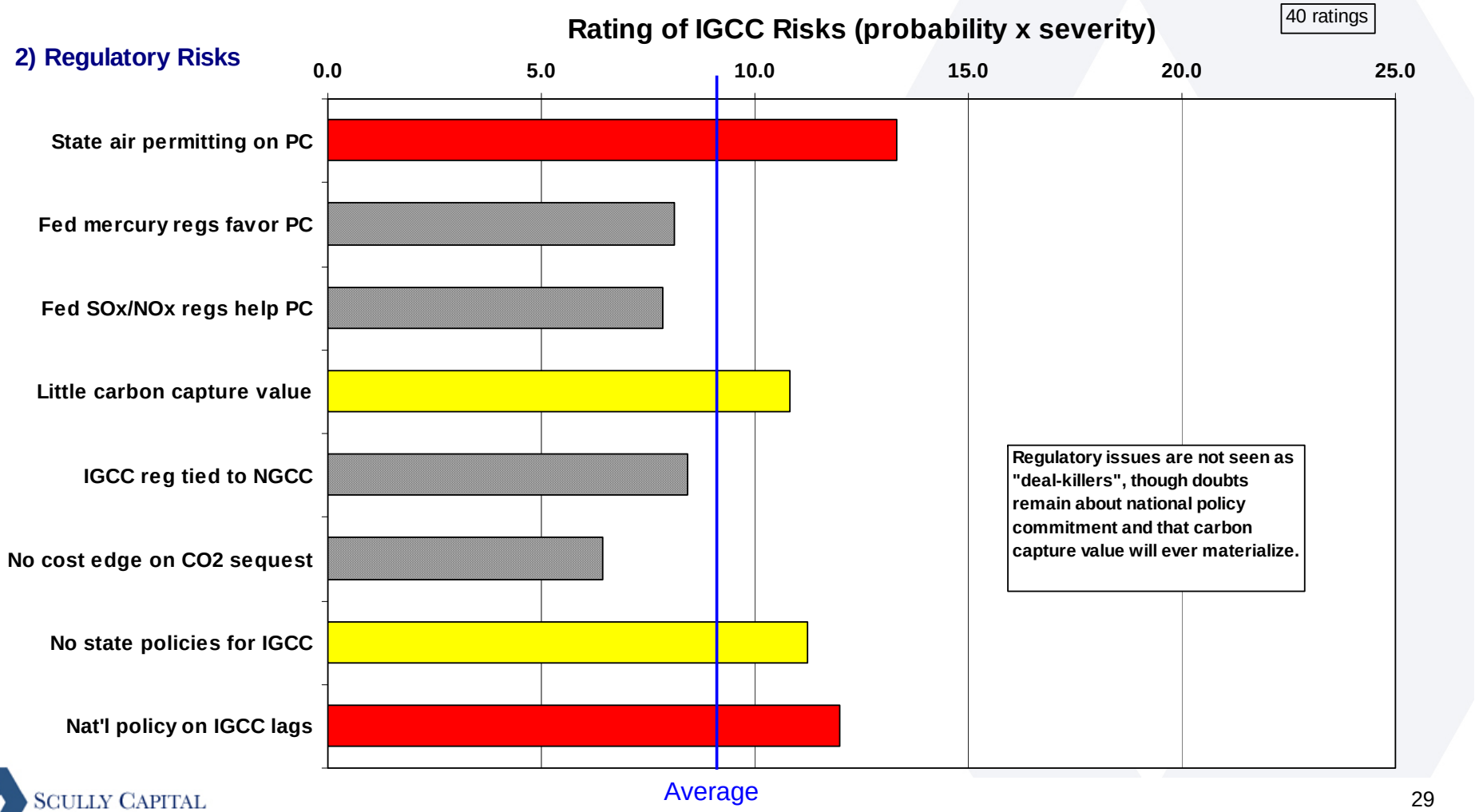
IGCC Risk Ratings 2005 – 1: Technical

High capital cost and excessive downtime remain key risks, though lower than in 2004. Technical risk also ranks high.



IGCC Risk Ratings 2005 – 2: Regulatory

Concerns about state & national regulation of coal grew. Unclear advantages on emissions for IGCC pose an investment risk.



IGCC Risk Ratings 2005 – 3: Market

IGCC units will be baseload, so PUC support would help with market risks. Financing difficulties are derivative from other risks.